CLAIMS

1. An on-chip bioassay method comprising the steps of: a microfluidic chip for introducing a cell is fixed on the undersurface of a microporous chip composed of a substrate through which a plurality of micropores arranged like a lattice penetrate, and thus forming a plurality of microchannels for introducing a cell between the microporous chip and the microfluidic chip for introducing a cell; a suspended cell is poured into a micropore of the microporous chip through the channel; then a microfluidic chip for introducing a test substance is fixed on the upper surface of the microporous chip such that its plurality of microchannels for introducing a test substance cross over to the plurality of microchannels for introducing a cell, and thus forming a plurality of microchannels for introducing a test substance between the microporous chip and the microfluidic chip for introducing a test substance; a test substance is poured through the channel and brought into contact with the cell in a micropore of the microporous chip; a level of effect of the test substance on the cell is detected in situ after a predetermined time, or at a predetermined time interval.

2. The on-chip bioassay method according to claim 1, wherein a water-resistant breathable sealing membrane is attached to the upper surface of the microporous chip in order to prevent the cell from spilling from the micropore before the suspended cell is poured into the micropore of the microporous chip.

3. The on-chip bioassay method according to claim 1 or 2, wherein

the substrate is a silicon substrate.

4. The on-chip bioassay method according to any one of claims 1 to 3, wherein the microfluidic chip is made from polydimethylsiloxane.

5. The on-chip bioassay method according to any one of claims 1 to 4, wherein a cell suspended in a gel is poured into a micropore of the microporous chip and is immobilized in the micropore.

6. The on-chip bioassay method according to claim 5, wherein a cell suspended in a low melting point agarose gel is used as the cell suspended in a gel.

7. The on-chip bioassay method according to any one of claims 1 to 6, wherein the microfluidic chip for introducing a cell and the microfluidic chip for introducing a test substance are the same microfluidic chips.

8. The on-chip bioassay method according to any one of claims 1 to 7, wherein temperature is controlled on the basis of a cell row of the micropore of the microporous chip and/or on the basis of a test substance row perpendicular to the cell row.

9. The on-chip bioassay method according to any one of claims 1 to 8, wherein a cell is removed from a micro chip after use and the chip is reused.

10. The on-chip bioassay method according to any one of claims 1 to 9, wherein one or more kinds of cells selected from a group

consisting of microbial cells, animal cells and plant cells, are used as a cell.

11. The on-chip bioassay method according to any one of claims 1 to 10, wherein a transformed cell is used as a cell.

12. The on-chip bioassay method according to any one of claims 1 to 11, wherein two or more kinds of test substances are used.

13. The on-chip bioassay method according to any one of claims 1 to 12, wherein means for detecting a level of effect of a test substance on a cell in situ is a CCD camera with spatial resolution, a photodiode array or a photographic plate, which detects a signal arising from the cell.

14. An on-chip bioassay kit comprising a microporous chip composed of a substrate through which a plurality of micropores arranged like a lattice penetrate for pouring a cell suspended in a gel such as agarose and immobilizing the cell, and two microfluidic chips fixed on each side of the microporous chip and forming a plurality of microchannel groups.

15. The on-chip bioassay kit according to claim 14, further comprising a water-resistant breathable sealing membrane fixed on one side of the microporous chip for preventing a cell from spilling from a micropore.

16. The on-chip bioassay kit according to claim 14 or 15, wherein a temperature control mechanism is provided on the basis of a row and/or a column of micropores on the substrate.

17. The on-chip bioassay kit according to any one of claims 14 to 16, wherein the substrate is a silicon substrate.

18. The on-chip bioassay kit according to any one of claims 14 to 17, wherein the microfluidic chip is made from polydimethylsiloxane.

19. The on-chip bioassay kit according to any one of claims 14 to 18, wherein the micropore is a through-hole of 300 to 900 μm × 300 to 900 μm square.

20. The on-chip bioassay kit according to any one of claims 14 to 19, wherein the width of the channel of the microfluidic chip is equal to the length of a side of the micropore.

21. The on-chip bioassay kit according to any one of claims 14 to 20, wherein the spacing between a plurality of the channels of the microfluidic chip has expanded extremities.